



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,552	02/08/2006	Richard Harding	MERCK-3144	9249
23599 7590 07/27/2011 MILLEN, WHITE, ZELANO & BRANIGAN, P.C. 2200 CLARENDON BLVD. SUITE 1400 ARLINGTON, VA 22201			EXAMINER HON, SOW FUN	
			ART UNIT 1798	PAPER NUMBER
			NOTIFICATION DATE 07/27/2011	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@mwzb.com

Office Action Summary	Application No.	Applicant(s)	
	10/567,552	HARDING ET AL.	
	Examiner	Art Unit	
	SOPHIE HON	1798	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04/25/11.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 18-37 and 42-56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 18-37 and 42-56 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Withdrawn Rejections

1. The 35 U.S.C. 112, 2nd paragraph rejection of claims 15, 42-48 in the prior Office action, is withdrawn due to Applicant's amendment dated 04/25/11.
2. The 35 U.S.C.102(b) and 35 U.S.C. 103(a) rejections of claims 1-7, 10-12, 17-41 over Winkler² as the primary reference in the prior Office action, are withdrawn due to Applicant's amendment dated 04/25/11.
3. The 35 U.S.C.102(b) and 35 U.S.C. 103(a) rejections of claims 15, 42-48 over Kumar as the primary reference in the prior Office action, are withdrawn due to Applicant's amendment dated 04/25/11.

New Rejections

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

4. Claims 15, 42-48, 51-55 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 15, 42-48, parent claim 15 recites "a polymer precursor solution", "a polymer component" and "said polymer precursor". It is unclear which of

Art Unit: 1798

the previous two components the term "said polymer precursor" is referring to. For the purposes of examination, the term "said polymer precursor" will be interpreted as being equivalent to the first term of "a polymer precursor solution". Clarification and correction are required.

Regarding claims 51-55, parent claim 51 recites an "intermediate structure", and then follows it by reciting "said intermediate". It is unclear as to whether the two terms are interchangeable. For the purposes of examination, they will be treated as such. Furthermore, the recitation of "laminate Comprising" should be rewritten as "laminate comprising".

Claim Rejections - 35 USC § 102

5. Claims 1-6, 14, 22-24, 27-28, 31-33, are rejected under 35 U.S.C. 102(b) as being anticipated by Kumar, WO01/18594 (US 6,939,587 is the US equivalent that is used here).

Regarding claims 1, 3-6, 27-28, 31, 33, Kumar teaches a method for preparing an alignment layer for aligning liquid crystal molecules, said alignment layer comprising (a) a polymer film formed from a polymer and (b) at least one reactive mesogen additive in monomeric form within said polymer film (reactive liquid crystal monomer, aligning agent, polyimide, column 8, lines 8-10, column 8, lines 20-25), wherein said at least one reactive mesogen additive is not the polymer used to form said polymer film, and wherein, after preparation of said alignment layer, where phase separation of the reactive mesogen from the polymer is induced by irradiation of polarized UV light

Art Unit: 1798

(reactive liquid crystal monomers, column 8, lines 20-25, which remain reactive), said alignment layer is expected to contain a very small amount of residual reactive mesogen additive that is physically trapped within said polymer of said polymer film, in the absence of a showing to the contrary. Kumar teaches that the method comprises: depositing a layer of a solution onto a surface (spin-coated onto the substrate, column 8, lines 17-18), said solution containing a precursor of the polymer (low temperature curing polyimide, column 8, lines 14-16), and processing said layer of solution to form said alignment layer wherein said at least one reactive mesogen additive is incorporated into said layer of solution before said processing (mixture, column 8, lines 8-18).

Regarding claims 2, 14, 22-24, 32, Kumar teaches that phase separation of the reactive mesogen from the polymer precursor is induced by irradiation of polarized UV light (reactive liquid crystal, column 8, lines 20-25). Thus the amount of reactive mesogen remaining in the polymer precursor after phase separation is expected to be very small. As such, in the absence of a showing to the contrary, the amount of residual reactive mesogen is expected to be well within the claimed range of less than 50% by weight, less than 20% by weight, less than 10% by weight, or less than 5% by weight, and to be within a range that overlaps the claimed range of 0.5 to 4% by weight, or 1 to 2% by weight.

6. Claims 19-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Winkler2 (US 6,538,712).

Winkler2 teaches a liquid crystal display device, which is an electro-optical device, comprising an alignment layer (column 7, lines 45-60) for aligning liquid crystal

Art Unit: 1798

molecules, said alignment layer comprising (a) a polymer film formed from a polymer (polyimide, column 7, lines 55-60) which is soluble in monochlorobenzene (column 8, lines 17-18). Winkler2 teaches that a solution of reactive mesogen in monomeric form is coated onto the polymer film of the alignment layer after preparation of said alignment layer (column 8, lines 49-50) where the solvent is monochlorobenzene (column 8, lines 65-67, column 9, line 1) and thus (b) at least one of the reactive mesogen in monomeric form is expected to infiltrate the polymer layer, the solvent monochlorobenzene being a carrier, and hence be present within the polymer film of the alignment layer after preparation of said alignment layer. As such, the alignment layer contains unreacted polymerizable groups in said at least one reactive mesogen which is not said polymer used to form said polymer film of said alignment layer. The amount of infiltrated reactive mesogen monomer is not expected to be large since the infiltration time is short (30 seconds to 5 minutes, column 9, lines 20-24), and thus corresponds to a small amount relative to the bulk of the polymer film, which is characteristic of an additive.

Although Winkler2 fails to teach the claimed method for preparing the alignment layer, and even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). In the instant case, Winkler2 teaches the presently claimed product as described above.

Claim Rejections - 35 USC § 103

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar, as applied to claims 1-6, 14, 22-24, 27-28, 31-33 above, and further in view of Tsuboyama (US 5,099,344).

Kumar teaches the method for preparing an alignment layer, where said alignment layer comprises a polyimide film and said at least one reactive mesogen additive within said polyimide film, and said alignment layer is obtained from a precursor solution of polyimide precursor and said at least one reactive mesogen additive, as described above. Kumar is silent regarding the specifics of the polyimide film.

However, Tsuboyama teaches that a common alignment layer comprises a polyimide film (column 4, lines 7-15) that has repeating units of formula A of Applicant (column 55, lines 35-50) for the purpose of providing the desired alignment characteristics.

Therefore, since Kumar is silent regarding the specifics of the polyimide film, it would have been necessary and hence obvious to have looked to the prior art for a suitable one. As such, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided a polyimide that has repeating units of formula A of Applicant, as a polyimide in the polyimide film of the method of preparing an alignment layer of Kumar, in order to obtain the desired alignment characteristics, as taught by Tsuboyama.

Art Unit: 1798

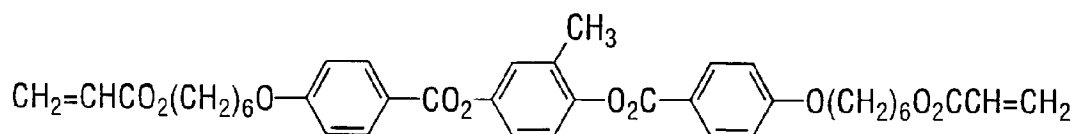
8. Claims 12, 29-30 rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar, as applied to claims 1-6, 14, 22-24, 27-28, 31-33 above, and further in view of Winkler4 (US 6,320,634).

Kumar teaches the method for preparing an alignment layer for aligning liquid crystals, where said alignment layer comprises a polymer film and said at least one reactive mesogen additive within said polymer film, as described above.

Regarding claim 12, Kumar is silent regarding the specific chemical structure of the reactive mesogen aside from teaching that it can be a diacrylate (column 8, lines 45-50).

However, Kumar teaches that the reactive mesogen diacrylate is used to form a birefringent layer (column 7, lines 25-30).

Winkler4 teaches that a birefringent layer (column 9, lines 39-40) can be formed from a conventional reactive mesogen diacrylate shown below (C6M liquid crystal monomer, Fig. 12B, column 10, lines 42-43) which corresponds to a homolog of formula IIa of Applicant where P^1 of Applicant = P^2 of Applicant = $\text{CH}_2=\text{CHCO}_2$ = polymerizable group, x of Applicant = y of Applicant = 6 instead of 3, g^1 of Applicant = g^2 of Applicant = $-\text{O}-$, L^1 of Applicant = L^2 of Applicant = L^3 of Applicant = L^5 of Applicant = L^6 of Applicant = H , L^4 of Applicant = alkyl group with 1 C atom and Z^3 of Applicant = Z^4 of Applicant = $-\text{COO}-$.



Therefore, since Kumar is silent regarding the specific chemical structure of the reactive mesogen diacrylate, it would have been necessary and hence obvious to have looked to the prior art for a suitable one. As such, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided a conventional reactive mesogen diacrylate of formula IIa of Applicant, as the reactive mesogen diacrylate in the method of forming an alignment layer of Kumar, in order to obtain the desired birefringence, as taught by Winkler⁴.

Regarding claims 29-30, Kumar teaches that phase separation of the reactive mesogen from the polymer precursor is induced by irradiation of polarized UV light (reactive liquid crystal, column 8, lines 20-25). Thus the amount of reactive mesogen remaining in the polymer precursor after phase separation is expected to be very small. As such, in the absence of a showing to the contrary, the amount of residual reactive mesogen is expected to overlap the claimed range of 0.5 to 4%, or 1 to 2%, by weight.

9. Claims 25-26, 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar, as applied to claims 1-6, 14, 22-24, 27-28, 31-33 above, and further in view of Komatsu (US 5,989,758).

Kumar teaches the method for preparing an alignment layer for aligning liquid crystals, where said alignment layer comprises a polymer film and said at least one reactive mesogen additive within said polymer film, as described above. Kumar is silent regarding the birefringence of the alignment layer before and after addition of said at least one reactive mesogen.

However, Komatsu teaches that an alignment layer can be optically isotropic (orientation substrate, column 24, lines 14-20) which means that the alignment layer has a birefringence that is ideally zero, which is within the claimed range of less than 0.05, or less than 0.01, or less than 0.005, for the purpose of providing minimal optical interference. Komatsu teaches alignment layers that are non-mesogenic (column 22, lines 9-15) which are more likely to be isotropic.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have made the alignment layer in the method preparing an alignment layer of Kumar, non-mesogenic, and to have provided it with a birefringence that is within a range of less than 0.05, or less than 0.005, where the birefringence of the alignment layer before addition of said at least one reactive mesogen has a birefringence of less than 0.01, in order to minimize any optical interference, as taught by Komatsu.

10. Claims 34-35, 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar, as applied to claims 1-6, 14, 22-24, 27-28, 31-33 above.

Kumar teaches the method for preparing an alignment layer, comprising depositing a layer of a solution onto a surface, said solution containing a precursor of the polymer, and processing said layer of solution to form said alignment layer, wherein said at least one reactive mesogen additive is incorporated into said layer of solution before said processing, and wherein the formed alignment layer is expected to contain a very small amount of residual reactive mesogen additive that is physically trapped within

Art Unit: 1798

said polymer of said polymer film, in the absence of a showing to the contrary, as discussed above.

Regarding claim 34, Kumar teaches that the method can further comprise an additional step of heating the solution to remove excess solvent during processing of said layer of solution to form said alignment layer (heat treatment, solvent evaporation, column 8, lines 65-66), for the purpose of providing the desired solid alignment layer.

Regarding claim 35, Kumar teaches that in place of the polymer, the solution can contain a polymer precursor wherein the polymer precursor is subjected to polymerization during processing of said solution to form said alignment layer (column 7, lines 43-48).

Regarding claim 56, Kumar teaches a laminate comprising the alignment layer for aligning liquid crystal molecules as described above, wherein the phase-separated polymerizable liquid crystal material forms a separate layer (column 8, lines 20-25) and is polymerized, for the purpose of providing the desired optically anisotropic film laminate (column 10, lines 8-10). At least one of the reactive mesogen additives that are entangled in said phase-separated alignment layer at the interface with the phase-separated liquid crystal material is expected to be chemically bound to the layer of polymerized liquid crystal material. Although Kumar fails to teach the claimed method for preparing the laminate, and even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the

Art Unit: 1798

prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). In the instant case, Kumar teaches the presently claimed laminate product as described above.

11. Claims 10-11, 15, 42, 47-48, 51-52, 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar, WO01/18594 (US 6,939,587 is the US equivalent that is used here).

Regarding claim 10, Kumar teaches a method for preparing an alignment layer for aligning liquid crystal molecules, where said alignment layer comprises: (a) a command layer comprising chromophores, wherein changes of the chemical structure and/or the orientational direction of the compound(s) induce a specific alignment of a liquid crystal material coated onto said layer (column 6, lines 35-46); and (b) at least one mesogen additive in monomeric form within said command film (liquid crystal material, column 6, lines 34-36), wherein, after preparation of said alignment layer, wherein phase separation of the reactive mesogen from the polymer is induced by irradiation of polarized UV light (column 6, lines 40-45), said alignment layer is expected to contain a very small amount of residual mesogen additive that is physically trapped within said polymer of said polymer film, in the absence of a showing to the contrary. Kumar teaches that the method comprises: depositing a layer of a solution onto a surface (spin-coating onto a substrate, column 6, lines 35-40), said solution containing one or more compounds of said command layer (chromophore, column 6, lines 35-40), and processing said layer of solution to form said alignment layer wherein said at least

Art Unit: 1798

one mesogen additive is incorporated into said layer of solution before said processing (layer of material-which includes liquid crystal material, column 6, 35-40). Kumar teaches that that the mesogen additive can be reactive (reactive liquid crystal, column 8, lines 8-20) for the purpose of providing the desired fixed alignment. Thus the alignment layer is expected to contain a very small amount of residual reactive mesogen additive that contains unreacted polymerizable groups, that is physically trapped within said polymer of said polymer film, in the absence of a showing to the contrary.

Regarding claim 11, Kumar teaches that the chromophore compounds are derived from azobenzene, stilbenes, cinnamate, chalcone and coumarins (column 7, lines 54-60).

Regarding claims 15, 42, 47-48, Kumar teaches a polymer precursor solution for preparing an alignment layer, comprising: a solvent, at least one mesogen additive and a polymer component (liquid crystal, column 4, lines 13-20), wherein said mesogen additive is a reactive one in monomeric form and said polymer component is a polyimide polymer (reactive liquid crystal monomer, aligning agent, polyimide, column 8, lines 8-10, column 8, lines 20-25). Although Kumar fails to disclose an amount of the one reactive mesogen additive in the polymer precursor solution, the amount of less than 20%, less than 10%, 0.5 to 4%, or 1 to 2%, by weight in a polymer precursor solution used for solution coating, is very common, used for the purpose of providing the desired thin coating. Kumar teaches that the formed alignment layer can comprise: (a) a polymer film formed from a polymer and (b) at least one reactive mesogen additive in

Art Unit: 1798

monomeric form within said polymer film (reactive liquid crystal monomer, aligning agent, polyimide, column 8, lines 8-10, column 8, lines 20-25), wherein said at least one reactive mesogen additive is not the polymer used to form said polymer film.

Regarding claims 51-52, Kumar teaches an intermediate structure for use in manufacturing a laminate comprising: a substrate, an alignment layer (column 8, lines 18-26), and a film comprising a polymerized liquid crystal material, for the purpose of providing the desired anisotropic film (reactive liquid crystal monomer, polymerized, column 10, lines 8-11), said intermediate consisting of: an alignment layer capable of aligning liquid crystal molecules and a substrate (column 8, lines 18-26), wherein said alignment layer comprises (a) a polymer film formed from a polymer and (b) at least one reactive mesogen additive in monomeric form within said polymer film (reactive liquid crystal monomer, aligning agent, polyimide, column 8, lines 8-10, column 8, lines 20-25), wherein said at least one reactive mesogen additive is not polymer used to form said polymer film, and wherein, after preparation of said alignment layer, where phase separation of the reactive mesogen from the polymer is induced by irradiation of polarized UV light (reactive liquid crystal monomers, column 8, lines 20-25, which remain reactive), said alignment layer is expected to contain a very small amount of residual reactive mesogen additive that is physically trapped within said polymer of said polymer film, in the absence of a showing to the contrary.

Regarding claim 54, Kumar teaches that the phase separation of the reactive mesogen from the polymer precursor is induced by irradiation of polarized UV light (reactive liquid crystal, column 8, lines 20-25). Thus the amount of reactive mesogen

Art Unit: 1798

remaining in the polymer precursor after phase separation is expected to be very small.

As such, in the absence of a showing to the contrary, the amount of residual reactive mesogen is expected to be within the claimed range of less than 5% by weight.

Regarding claim 55, Kumar teaches a method of preparing a laminate comprising the intermediate structure as described above, wherein the phase-separated polymerizable liquid crystal material forms a separate layer on the intermediate structure (column 8, lines 20-25) and is polymerized, for the purpose of providing the desired optically anisotropic film laminate (column 10, lines 8-10).

12. Claims 43, 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar, as applied to claims 10-11, 15, 42, 47-48, 51-52, 54-55 above, and further in view of Winkler⁴ (US 6,320,634).

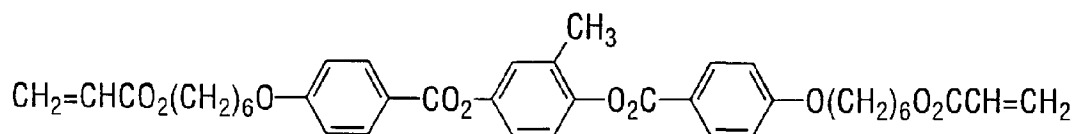
Regarding claim 43, Kumar teaches the polymer precursor solution comprising the reactive mesogen additive, as described above. Kumar is silent regarding the specific chemical structure of the reactive mesogen aside from teaching that it can be a diacrylate (column 8, lines 45-50).

However, Kumar teaches that the reactive mesogen diacrylate is used to form a birefringent layer (column 7, lines 25-30).

Winkler⁴ teaches that a birefringent layer (column 9, lines 39-40) can be formed from a conventional reactive mesogen diacrylate shown below (C6M liquid crystal monomer, Fig. 12B, column 10, lines 42-43) which corresponds to a homolog of formula IIa of Applicant where P^1 of Applicant = P^2 of Applicant = $CH_2=CHCO_2$ = polymerizable group, x of Applicant = y of Applicant = 6 instead of 3, g^1 of Applicant = g^2 of Applicant =

Art Unit: 1798

-O-, L¹ of Applicant = L² of Applicant = L³ of Applicant = L⁵ of Applicant = L⁶ of Applicant = H, L⁴ of Applicant = alkyl group with 1 C atom and Z³ of Applicant = Z⁴ of Applicant = -COO-.



Therefore, since Kumar is silent regarding the specific chemical structure of the reactive mesogen diacrylate, it would have been necessary and hence obvious to have looked to the prior art for a suitable one. As such, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided a conventional reactive mesogen diacrylate of formula IIa of Applicant, as the reactive mesogen diacrylate in the polymer precursor solution of Kumar, in order to obtain the desired birefringence, as taught by Winkler4.

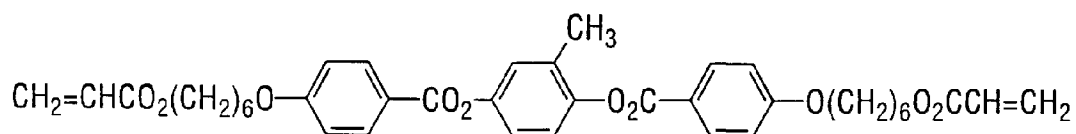
Regarding claim 53, Kumar teaches the intermediate structure wherein said alignment layer comprises a polymer film which is a polyimide film and said at least one reactive mesogen additive is not said polymer used to form said polyimide film, as described above. Kumar is silent regarding the specific chemical structure of the reactive mesogen aside from teaching that it can be a diacrylate (column 8, lines 45-50).

However, Kumar teaches that the reactive mesogen diacrylate is used to form a birefringent layer (column 7, lines 25-30).

Winkler4 teaches that a birefringent layer (column 9, lines 39-40) can be formed from a conventional reactive mesogen diacrylate shown below (C6M liquid crystal

Art Unit: 1798

monomer, Fig. 12B, column 10, lines 42-43) which corresponds to a homolog of formula IIa of Applicant where P^1 of Applicant = P^2 of Applicant = $\text{CH}_2=\text{CHCO}_2$ = polymerizable group, x of Applicant = y of Applicant = 6 instead of 3, g^1 of Applicant = g^2 of Applicant = $-\text{O}-$, L^1 of Applicant = L^2 of Applicant = L^3 of Applicant = L^5 of Applicant = L^6 of Applicant = H , L^4 of Applicant = alkyl group with 1 C atom and Z^3 of Applicant = Z^4 of Applicant = $-\text{COO}-$.



Therefore, since Kumar is silent regarding the specific chemical structure of the reactive mesogen diacrylate, it would have been necessary and hence obvious to have looked to the prior art for a suitable one. As such, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided a conventional reactive mesogen diacrylate of formula IIa of Applicant, as the reactive mesogen diacrylate in the alignment layer of the intermediate structure of Kumar, in order to obtain the desired birefringence, as taught by Winkler4.

13. Claims 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar, as applied to claims 15, 42, 47-50 above, and further in view of Komatsu (US 5,989,758).

Kumar teaches the polymer precursor solution comprising polyimide, as described above. Kumar is silent as to whether it can form an alignment layer having a birefringence of less than 0.05 or less than 0.005.

Art Unit: 1798

However, Komatsu teaches that a layer formed from polyimide can be isotropic (column 24, lines 9-12) and that an alignment layer formed from it is desirably optically isotropic (orientation substrate, column 24, lines 14-20) which means that the layer has a birefringence that is ideally zero, which is within the claimed range of less than 0.05, or less than 0.01, or less than 0.005, for the purpose of providing minimal optical interference.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the polymer precursor solution of Kumar, with the capability to form an alignment layer with a birefringence that is within a range of less than 0.05, or less than 0.005, in order to minimize any optical interference, as taught by Komatsu.

14. Claims 15, 42, 47-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schunk (US 2003/0080326), as evidenced by Hong (US 2003/0236418).

Regarding claims 15, 42, 47-48, Schunk teaches a solution comprising: a solvent, a polymer component comprising triacetate cellulose ([0042]) and an additive ([0045]) which can be an ultraviolet-absorbing compound in monomeric form that has a mesogen component (II-A, [0022]), wherein said mesogen component-containing ultraviolet-absorbing compound is not said polymer component, for the purpose of providing the desired stabilization ([0050]). Schunk teaches that the solution contains the stabilizing mesogen component-containing ultraviolet-absorbing compound in an amount of 0.05 to 2 % by weight (ultraviolet absorber, [0035]) which is within the claimed range of less than 20%, or less than 10%, or 0.5 to 4%, or 1 to 2%. Schunk

Art Unit: 1798

teaches that the stabilizing mesogen component-containing ultraviolet-absorbing compound can have two OH groups (R is hydrogen, [0022]) which are reactive, as evidenced by Hong.

Hong teaches that an ultraviolet-absorbing compound that has OH groups that are reactive (hydroxyl, [0027]).

Although Schunk fails to teach that the solution is a polymer precursor solution for preparing an alignment layer, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In the instant case, Schunk teaches the presently claimed solution composition comprising the polymer to form (a) a polymer film and (b) the at least one reactive mesogen additive in monomeric form which will be within the formed polymer film.

Regarding claims 49-50, Schunk teaches an optical polymer film layer comprising (a) a polymer film formed from a polymer ([0042]) and (b) an additive ([0045]) which can be an ultraviolet-absorbing compound in monomeric form that has a mesogen component (II-A, [0022]), wherein said mesogen component-containing ultraviolet-absorbing compound is not said polymer component, for the purpose of providing the desired stabilization ([0050]). Schunk teaches that the stabilizing mesogen component-containing ultraviolet-absorbing compound can have two OH groups (R is hydrogen, [0022]) which are reactive, as evidenced by Hong.

Art Unit: 1798

Hong teaches that an ultraviolet-absorbing compound that has OH groups that are reactive (hydroxyl, [0027]).

In addition, Schunk teaches that the optical polymer film layer is a solvent processed cellulose based film (solution, [0042]).

Although Schunk fails to teach that the optical polymer film layer is an alignment layer for aligning liquid crystal molecules, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In the instant case, Schunk teaches the presently claimed solvent processed cellulose based film.

Regarding claim 50, Schunk teaches that the polymer film is a triacetate cellulose film ([0042]).

15. Claims 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schunk, as evidenced by Hong, as applied to claims 15, 42, 47-50 above, and further in view of Komatsu (US 5,989,758).

Schunk teaches the polymer precursor solution comprising triacetate cellulose, as described above. Schunk is silent as to whether it can form an alignment layer having a birefringence of less than 0.05 or less than 0.005.

However, Komatsu teaches that a layer formed from cellulose triacetate can be isotropic (triacetyl, column 24, lines 39-46) and that an alignment layer formed from cellulose triacetate is desirably optically isotropic (orientation substrate, column 24, lines

Art Unit: 1798

14-20) which means that the layer has a birefringence that is ideally zero, which is within the claimed range of less than 0.05, or less than 0.01, or less than 0.005, for the purpose of providing minimal optical interference.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the polymer precursor solution of Schunk, with the capability to form an alignment layer with a birefringence that is within a range of less than 0.05, or less than 0.005, in order to minimize any optical interference, as taught by Komatsu.

Response to Arguments

16. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

17. Claims 8-9, 13, 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. Claim 44 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 1798

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz, can be reached at (571)272-1206. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sophie Hon/

Sow-Fun Hon

Primary Examiner, Art Unit 1798